Patrick James Daley, J Fundam Renewable Energy App 2016, 6:5(Suppl)
http://dx.doi.org/10.4172/2090-4541.C1.017

Image analysis based ash fusion testing

Patrick James Daley
University of Nottingham, UK

Ash fusion characteristics for a wide range of potential biomass fuels can be fully automated using image analysis techniques. Traditionally, ash fusion analysis involves heating pyramidal ash pellets in a furnace under oxidizing or reducing conditions to over 1500°C. Four characteristic behaviours over the temperature range are then identified, namely; 'initial deformation', 'sphere' or 'softening', 'hemisphere' and 'flow' temperatures. Whilst these temperatures are intended to help the operator predict boiler performance, they rely on visual observation rather than an objective physical measurement. Differences of up to 400°C have been reported for the initial deformation temperature of a single sample obtained from different laboratories. A fully automated technique using image analysis has been developed that does not require manual interpretation and can provide a complete fingerprint of the behaviour of each sample. The relevance of these four temperatures will be discussed in detail as will the impact of improvements in furnace hardware and image analysis software. A large test matrix of coals and biomass samples (including Russian, US and UK coals, hard and softwoods, and agrifuels) was tested to show how behavioural differences can be related to initial mineral composition whilst accurately predicting slagging and fouling potential.

Biography

Patrick James Daley received his MEng from the University of Nottingham in Chemical Engineering in 2014; this included a one year placement with RWE npower. He currently works in the Centre for Doctoral Training as a Research Engineer at the University of Nottingham in the Energy Technologies Building. He is working towards an Engineering Doctorate in the development of advanced ash fusion testing. His work is being sponsored by BF2RA and is supervised by GE.

ezxpjd@nottingham.ac.uk

Notes: